

इंटरनेट

मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 8593-2 (1988): Recommendations for centralized lubrication as applied to plant and machinery, Part 2: Grease lubrication [PGD 19: Lubricating Equipments]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE



Indian Standard

RECOMMENDATIONS FOR CENTRALIZED LUBRICATION AS APPLIED TO PLANT AND MACHINERY

PART 2 GREASE LUBRICATION

1. Scope — Lays down the recommendations for centralized grease lubrication system for plant and machinery with respect to installation practice, system pipe work and ancillary equipment for light and heavy industries.

1.1 This standard shall also cover grease like substances.

2. Terminology

2.1 Centralized Lubrication System — A system in which two or more lubrication points on a machine or group of machines are served with the same lubricant from a common source.

2.2 Pressure Drop — The difference in pressure of a medium before and after an event, that is, the medium having flowed through a length of pipe, valve etc.

2.3 Shear Stress — The stress which is applied to the lubricant to induce flow. When grease is flowing through a circular tube, the stress at the wall is given by:

$$F = \frac{pd}{4L} \quad \text{where,} \quad \begin{array}{ll} F = \text{Shear stress} & \text{Pa} \\ p = \text{Pressure drop} & \text{Pa} \\ d = \text{Tube bore} & \text{m} \\ L = \text{Length} & \text{m} \end{array}$$

2.4 Shear Rate — The velocity gradient, in a moving fluid in a direction perpendicular to the velocity, expressed in per second.

2.5 Apparent Viscosity — The ratio of shear stress to shear rate as defined above in cases where this does not remain constant with varying shear stress. This applies to non-newtonian fluids.

2.6 Yield Stress — The minimum stress required to produce flow.

2.7 Positive Displacement Pump — The pump which creates flow of medium by transferring it to a chamber followed by movement of one of the chamber walls.

2.8 Directional Valve — The valve used to direct the flow of fluid into a pipe line as desired.

2.9 Feeder — The positive displacement device where controlled volumes of lubricant are allowed to pass to points of lubrication by transferring the lubricant to a chamber followed by wall movement.

Note — Feeders are also known as distributors, metering valves and valve manifold.

3. Classification of Grease Lubrication Systems — Grease Lubrication Systems are always total loss systems where the grease used in the points of lubrication is not collected and returned to the reservoir for recirculation. Based on the working principle, the system is classified into the following types.

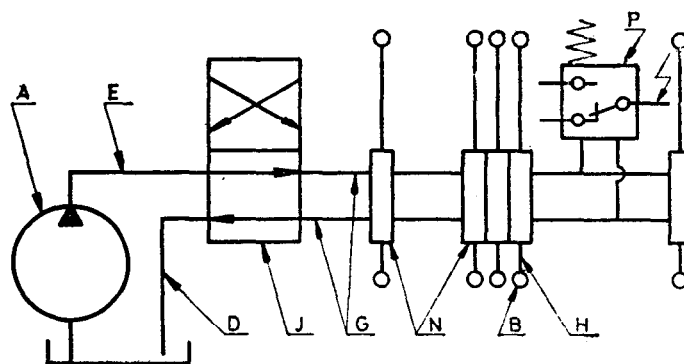
3.1 Dual Line End of Line System (Fig. 1) — This type of system basically consists of a reservoir with in-built reciprocating plunger pump, reversing valve, feeders, end pressure relay and pipings.

In this system, there are two main supply lines which are laid parallel to the equipment to be lubricated. Inlet to grease feeders are connected to these two lines and the outlet from the feeders are connected through brass/steel tubes to points of lubrication.

Adopted 19 October 1988

© May 1989, BIS

Gr 3



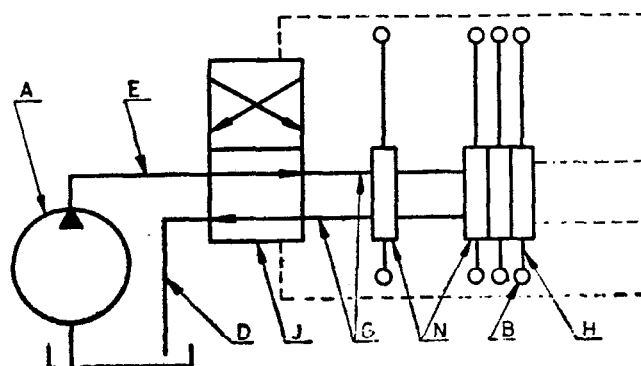
- A Pump with lubricant reservoir
- B Lubrication point
- D Relief line
- E Pressure line
- G Main line
- H Feed line
- J Changeover valve 4/2
- N Two line metering device
- P End pressure relay

FIG. 1 DUAL LINE END OF LINE SYSTEM

The pump feeds grease alternately into the two main lines through the reversing valve. The end pressure relay is located at the farthest point from the pump which trips the pump motor and changes the position of the reversing valve as soon as a pre-set pressure is achieved in the line being pressurized. This completes the cycle. The next cycle is started through an adjustable timer.

A dual line system may have a working pressure of 15/40 MPa and can feed metered grease to about 1 000 lubrication points through a pipe line, maximum length of which shall not exceed 150 m on either side of the pump.

3.2 Dual Line Loop Type System (Fig. 2) — This system is similar in design to that of dual line end of line system except that the reversing valve in this system is operated hydraulically. To effect reversal of the valve against a set pressure to be achieved at the farthest end of main line, either system is laid out in a loop form or a small pipe line is drawn from the end of the main lines and connected to the reversing valve as shown in Fig. 2.

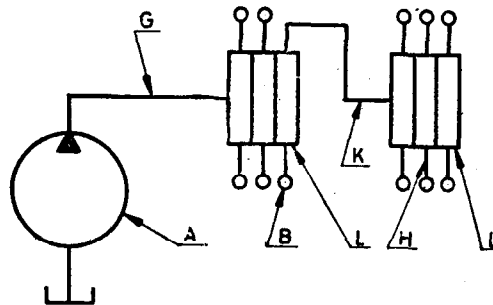


- A Pump with lubricant reservoir
- B Lubrication point
- D Relief line
- E Pressure line
- G Main line
- H Feed line
- J Changeover valve 4/2
- N Two line metering device

FIG. 2 DUAL LINE LOOP TYPE SYSTEM

The advantage of the system is that it ensures positively a minimum set pressure at end of main line which is considered essential to ensure that all feeders have operated and that all points have been lubricated.

3.3 Single Line Progressive System (Fig. 3) — In this type of system, there is only one line running along the equipment to be lubricated. The construction of feeders are such that until and unless first point is lubricated, the second point does not receive grease lubricant, hence the name 'Progressive'. There is no reversing valve in the system and hence the requirement of either end pressure relay or loop type layout is not there.

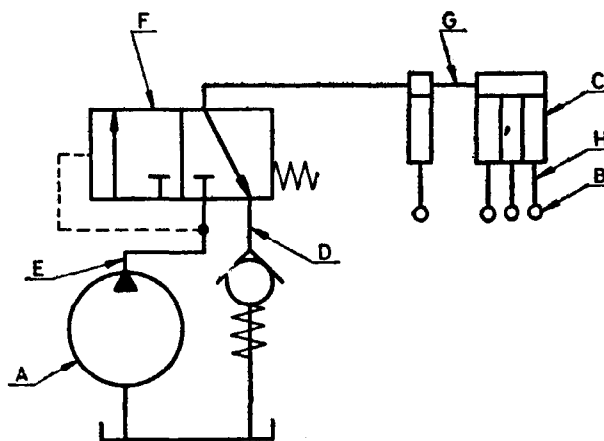


- A Pump with lubricant reservoir
- B Lubrication point
- G Main line
- H Feed line
- K Secondary feed line
- L Progressive plunger metering device

FIG. 3 SINGLE LINE PROGRESSIVE SYSTEM

3.4 Single Line Injector System (Fig. 4) — In this type of system also there is only one line running along the equipment to be lubricated. The construction of injectors (feeders) is such that it operates on the principle of compression and decompression of a spring against the required pressure.

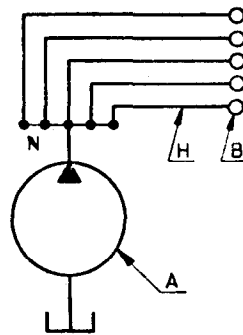
This type of system is not very positive and hence can be adopted only for non-critical small equipment.



- A Pump with lubricant reservoir
- B Lubrication point
- C Metering device with injectors
- D Relief line
- E Pressure line
- F Relief valve
- G Main line
- H Feed line

FIG. 4 SINGLE LINE INJECTOR SYSTEM

3.5 Multi-Line System (Fig. 5) — In this type of system, there are number of plunger pumps operated in sequence by a cam which may either be motor-driven or machine-driven. Outlet from each pump is directly connected to the point of lubrication. Due to its constructional constraints, the maximum number of points to be lubricated is limited to 24. However, this type of system is ideal for lubrication of equipment having small number of lubrication points and requiring lubrication only during the movement of the same, as for example, overhead cranes, etc.



A Pump with lubricant reservoir
B Lubrication point
H Feed line
N Two line metering device

FIG. 5 MULTI-LINE SYSTEMS

4. Pumps

4.1 Method of Drive — The pumps may be operated by hand or may be driven by mechanical means. Alternately, pumps may be provided with pneumatic, hydraulic or electrical drive. The drive may be either rotary or reciprocating.

4.2 Mounting — The pumps may be mounted either inside or outside the reservoir. In either case, the pumps shall be readily accessible for maintenance. Lubrication pumps which are operated through mechanical linkage from the parent machines shall be mounted in such a way that neither the pump nor the drive is subjected to deflection loads.

4.3 Pump Name Plates

4.3.1 The name plates of pumps shall contain the following:

- Manufacturer's name and address,
- Manufacturer's part/model and serial numbers, and
- Output at rated pressure and R.P.M.

4.3.2 The supplier's name plate should not be removed by the user. If necessary, a second name plate with the salient information may be provided adjacent to the pump so that it can be easily read. This is important for maintenance and replacement purposes.

4.3.3 In the case of rotary pumps, the direction of rotation should be clearly indicated on the pump. The marking may be on the motor unit in the case of integral pump and motor unit.

5. Reservoir

5.1 Permanent Type — The design and construction of this type of reservoir should be such that no foreign matter, including splashed water can enter in it. It should be adequately protected against internal corrosion where this is likely to occur. A suitable internal coating may be given to minimise adhesion.

5.1.1 Reservoirs, excepting the very small sizes, should have a bottom fill connection. Using a suitable transfer pump the reservoir shall be filled through this connection.

5.1.2 The reservoirs should incorporate a follower plate or scraper arm and scoop to ensure positive priming of pump.

5.1.3 Reservoirs shall be fitted with means for allowing air to escape during filling.

5.1.4 The reservoirs should be provided with a suitable level indicator to indicate the level of contents within.

5.1.5 Large reservoirs shall be designed with adequate facilities for emptying and internal cleaning.

5.1.6 Reservoirs, which are to be filled from a distance should be equipped, wherever practicable, with level indicating and controlling devices.

6. Instrumentation

6.1 Control — In automatic systems, the cycle time, as well as the time for which the pump will run in each cycle may be controlled by electrical, pneumatic, mechanical or electronic timer where applicable. The method of automatic changeover in dual line systems is given in 3. Manual control should be possible in case of failure.

6.2 Monitoring — Different types of instrumentation are available for monitoring pressure. Monitor may be of indicating type like pressure gauge or may give audiovisual signals.

6.3 Fault Indication — Different types of instrumentation may be used to give audiovisual signals for various system faults.

7. Pipe, Tube, Hose and Fittings

7.1 Pipe — Seamless steel pipe conforming to IS : 6631-1972 'Steel pipes for hydraulic purposes' is recommended for centralised grease systems.

7.1.1 Pressure rating — The maximum pressure rating should be 25 MPa up to a size of 25 NB, and 15 MPa for sizes between 25 NB to 50 NB.

7.1.2 Pipe end shall be threaded in accordance with IS : 554-1985 'Dimension for pipe threads where pressure tight joints are made on the threads (*third revision*)'.

7.2 Tube — Seamless steel (cold drawn), copper, brass, nylon tube, etc, may be used depending upon the service conditions/applications.

7.3 Hose — Wire reinforced, rubber covered hydraulic hose conforming to IS : 7651-1979 'Wire reinforced rubber covered hydraulic hose (*first revision*)' may be used. However, the bursting pressure is to be checked against the pressure requirements.

7.4 Fittings

7.4.1 Pipe fittings — Seamless steel fittings capable of withstanding a working pressure of 34 MPa, *Min* shall be used. These may be of bite type or any other type as agreed to between the supplier and the user.

7.4.2 Tube fittings — Bite type fittings shall be used.

8. Pipe/Tube Sizes — The selection of pipe sizes for a particular system is dependent upon the layout of the system, the spread of the system, the number of lubrication points connected to the system and system pressure selected. The feed pressure required at the inlet of a feeder varies depending on pressure drop across the feeder, pressure drop in the pipe line from the feeder to the point of lubrication and the resistance inside the point of lubrication. However, as a thumb rule, 4 MPa is considered adequate pressure at the inlet of feeders. The size of main line should be selected in such a way that the feeder located at the farthest end from the pump is assured of 4 MPa and the normal working pressure at the pump should not exceed its rated pressure. The pipe line loss depends upon size of pipe, type of grease used and the rate of flow of grease.

EXPLANATORY NOTE

This standard is one of the series of Indian Standards on centralized lubrication. Other parts in the series are:

Part 1

Oil lubrication

Part 3

Aerosol lubrication

This standard is only a general guide and does not lay down the specific design requirements. It is, therefore, imperative that while designing new system consultation takes place between user, equipment designer and lubricant supplies.

In preparing this specification assistance has been derived from the following standards:

BS 4807 : 1972 'Recommendations for centralized lubrication as applied to plant and machinery', issued by the British Standards Institution.

ISO 5170-1977 'Machine tools — Lubrication Systems' issued by the International Organization for Standardization.

DIN 24271 (Part 2)-1982 'Centralized lubrication systems — Graphical symbols for technical drawings', issued by the Deutsches Institut Für Normung (West Germany).